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ARROWHEAD

COMBAT DEVELOPMENTS COMMAND

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FLARE

Commander's Call

This Christmas season and the new year bring a new hope for peace--

A hope that the message of Christmas--"Peace on earth, good will toward men" will be fulfilled in the coming new year. But, we know that the way has always been rough! The history of our Army shows that the cause of peace with freedom has demanded many sacrifices from our Soldiers during this season. Far from home and family, they have fought to protect our way of life.

In the winter of 1777-78, the hardcore of the young Continental Army who stayed with George Washington at Valley Forge suffered greatly. Some Soldiers were without shoes, pants, or blankets. Weeks went by without meat and the men were hard-pressed to find enough to eat. But they weathered the storm and our Army was to emerge from Valley Forge more effective than ever. Over the winter of 1917-18, untried American Soldiers got their first taste of trench warfare. They went on later in the year to one of the greatest battles ever fought in war, the Meuse-Argonne offensive. Shortly thereafter, they put an end to the fighting. In World War II, at the siege of Bataan in the Philippines, on the sands of Tunisia, in the mountains of Italy, and the forests of Belgium during the Battle of the Bulge, the American Soldier spent his holiday season in a grim struggle against the terrain, weather and the rampant enemy to protect our shores and to preserve our democratic way of life.

More recently, our Army has been called upon twice to be far from home at Christmas time. On the hillsides of Korea, and in the jungles of Vietnam, the young men and women of our Nation have served once again to combat the forces of aggression set loose in the world.

Peace with freedom has not been easily won. The sacrifices have been great, but, in each case, our Army has been loyal to its trust--it has won its battles! The strength of our democracy has prevailed. As military and civilian members of our Army, we can be proud of our commitment to serve our country in the cause of freedom and in the cause of peace.

Merry Christmas! May God bless each of you and your families during the New Year.

John Norton

JOHN NORTON
Lieutenant General, US Army
Commanding

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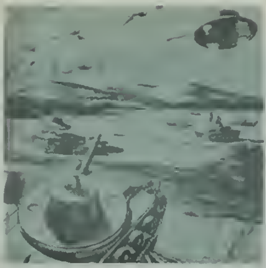

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OFF LIMITS
THE COMPUTER HAS NO MORAL VALUES

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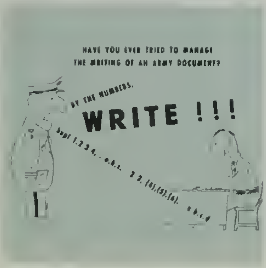
HAVE YOU EVER TRIED TO MANAGE THE WRITING OF AN ARMY DOCUMENT?
BY THE NUMBERS.
WRITE !!!
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ARROWHEAD

COMBAT DEVELOPMENTS COMMAND

December 1972 No. 46

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CDC Knows No Limits

HOW FAR IS WAY-OUT?

by Bill Herman

Editor's Note:
This article was written almost ten years ago, when CDC was just getting underway. Many things have changed since then. Can you see a difference in the approach to new ideas then and now?

The old farmer who saw his first giraffe, and was close enough to touch it, was still firmly convinced "there ain't no such animal" because he had never seen one before. And if you've never seen a tank turret which could detach itself from its hull, fly off on reconnaissance and return, wouldn't you also be inclined to say, "there can never be such a turret!"?

At this point, you have much in common with the Army's combat developers—they've never seen such a turret either. But with their unique occupational optimism, they're looking and seem fully assured there may someday actually be one.

Where are they looking?

As far out as they can distinguish the possible merits of an idea.

Understanding the conceptual side of combat developments requires no depth study if we remember that it is a creative but well ordered process, based on logically deduced ideas, not soothsayers' dreams. Concept development follows a definite pattern designed to translate ideas into *means* for improving the combat effectiveness of the U.S. Army—as it is today and may need to be some twenty years in the future.

The task of the U.S. Army Combat Developments Command is to develop these creative ideas into recommended operational or organizational doctrines which determine how the Army will fight and support, be organized, and be equipped. Part of CDC's mission is to develop and convert ideas for new materiel to stated requirements. From these approved requirements,

Army developing agencies, such as the U.S. Army Materiel Command and various industries, will produce designs, prototypes, production models and, eventually, modern hardware, weapons, and communications systems.

It is important that increases in Army combat effectiveness be rapid, realistic in cost, and orderly. The requirement for orderly development exists even at the first stages of ideation because all potential combat development ideas must also be related in *time*. Indeed, time is one of the critical elements in the function and understanding of combat developments. Among its other facets, it often marks the dividing line between probability and possibility.

Awareness of the time factor allows the developer to work "way out" with more assurance; it allows him to probe and study toward the proper objectives.

At the point of first exposure to an idea the combat developments specialist becomes a split personality. He must be both evaluator of the idea and its foster father. He must play the dual role of friend and critic, rich uncle and country cousin. He may personally like the idea but at the same time be aware of facts that would prevent him from touching it with a 90mm gun barrel. Or he may be personally repelled by the idea while finding it professionally irresistible. To insure a fair evaluation, he must know a broad military field in depth, appreciating that ideas have no branch, service, or nationality.

Just how do developers greet an idea that might elicit from the ordinary citizen several short, sharp shakes of the head? First, the evaluator of a new idea examines both ends of an idea—its beginning and its final or possible disposition. This is the crux of the combat developments effort—the focus of conceptual, operational, organizational, doctrinal, and materiel development ideas.

An idea must meet many tests, since combat developments covers the entire span of an idea from its inspiration to implementation. First, it must meet a need; then it should suggest a goal, a course of direction that will permit or assure that its implementation will actually enhance the combat effectiveness of the Army in a certain time period. It must also suggest a logical progression that is in step with the Army's over-all planning and projected visualization of future war. In effect, it must have goal posts as well as time posts.

The idea must be evaluated for compatibility with many other programs in progress or anticipated, its chances of near-duplication of similar programs, its flexibility or inflexibility to sudden change, and the limitations of resources and materials extending over a decade or more.

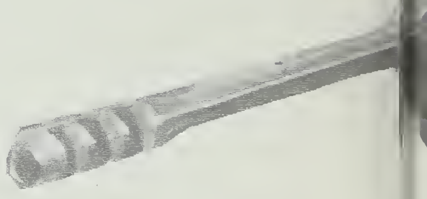
To the creator of an idea, it must show promise of becoming an Army objective, with more than reasonable assurance of fulfillment. In short, an idea must itself be fit, as well as fitting, in the total combat developments picture.

Every idea fed into the hopper is sized up to fit the Army's plans in various point-of-reference years. This is not done by casual, haphazard "guess-timate", but through deliberate, laborious study and examination of the many forces and factors which can, or may, affect our future. Thus the combat developer must have, readily available, definitive information which will give him the best possible perspective of the future.

He has at his command much distilled and predigested information on research and development studies in his own or sister services. He is aware of national goals and military policy and the problems that must be faced in achieving them, including our alliances and commitments in the family of nations. He is aware of the socio-political aspirations and problems of other countries, allied, hostile, or uncommitted. He knows how fast and deep geographical drives can go to change the military complexion of a jungle village or a whole continent.

He must keep up to date on developments work going on in other armies and in other countries so he can help our Army keep up with the flow of progress in tactics, organization, mobility, communications, and weaponry. His knowledge of what our potential enemies are doing in this field not only rounds out his own qualifications as a developer or evaluator, but also is one of his vital decision-making tools.

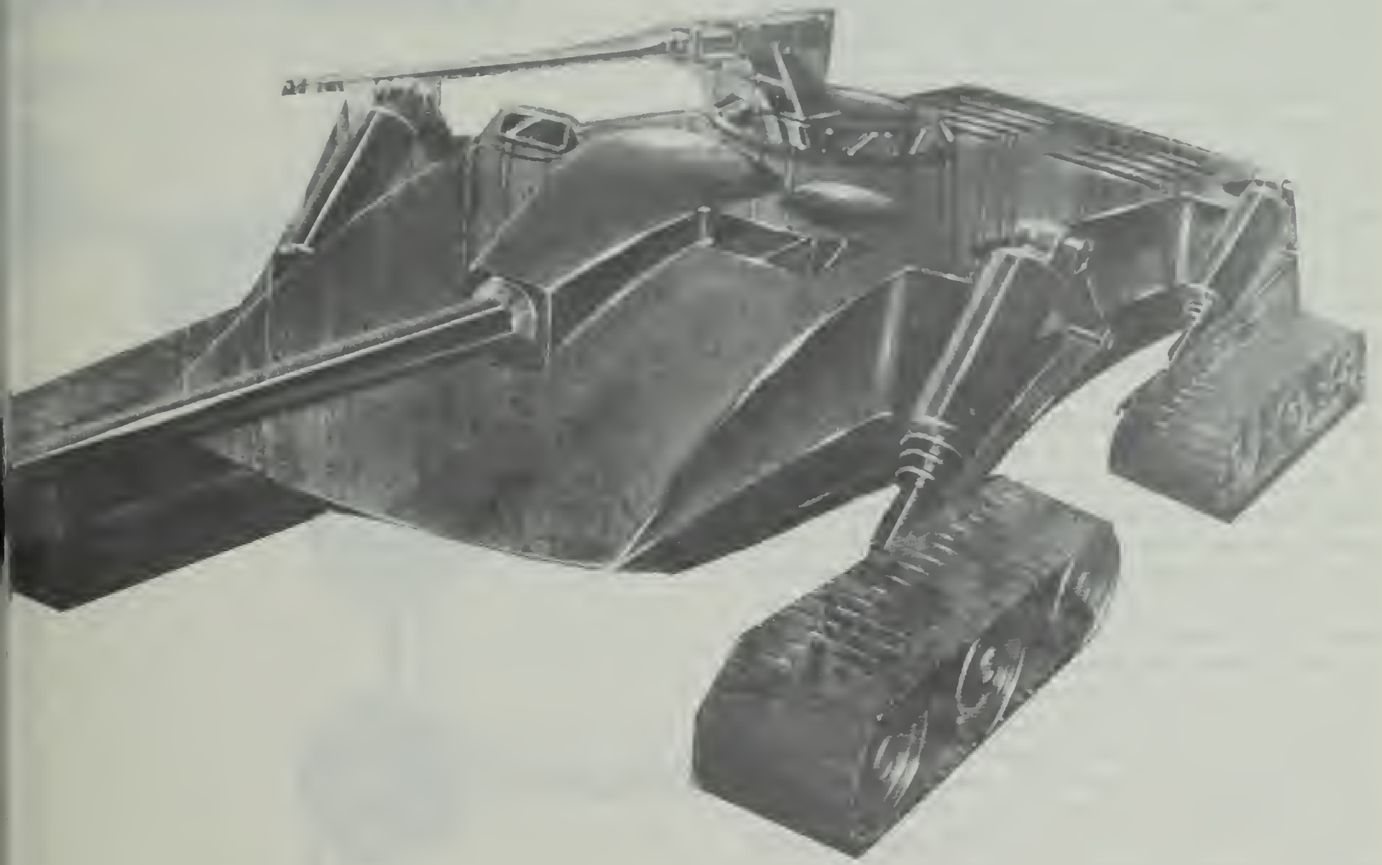
The input of this vital information comes from many sources. For example, CDC's Strategic Studies Institute (collocated with the Army War College at Carlisle Barracks, Pa.) visualizes the nature and use of Theater Armies or larger in achieving US national objectives where international or external factors affect the Army's role.



Other CDC units take a more immediate view of warfare in expediting operational and materiel developments for special warfare and special environment operations.

Other development tools are the "technological forecasts". Formerly prepared by the technical services, these are now the responsibility of the developing agencies under guidance of the Army Research Office.

Like the Army, industry is not staffed with dreamers in the actual or poetic sense. The planners and developers in industry are hard-nosed realists, too. They like to work from a known point, armed with known facts, to arrive at a destination which, while previously untraversed, is not entirely unattainable—and this goes as far as the surface of the moon.



Industry, too, has long-range plans and planning units which must be able to visualize where they are going or hope to be during specific increments of time. Some of this individual planning attempts to parallel where Army developments will be at a certain time in the future. And some Army plans are predicated on the same estimate—namely, where industry will be in a given time frame. This "parallel predicting" is an integral part of technological forecasting.

A technological forecast is nothing more than a prediction or estimate as to where an industry or the state-of-the-art will be at a certain time in the future. Like creating foreign policy or identifying national goals from the full knowledge of past history, this is done by projecting the known advances made in, say, metal-forming and cutting tools, the plastics and chemical industries, electronics, petroleum science, and transportation, to name but a few. Forecasts may be made for almost all academic, scientific, technical, administrative, and many social activities.

Army combat developments ideas are evaluated with full confidence in a healthy, adaptive, and highly competitive American industry. Although for many reasons industry planners do not always predict as far out in time as does the Army combat developments system, they must project their plans if they are to survive. In addition, they must also back up their estimates with both pure and applied research from which everybody gains.

Knowledge of what industry can be expected to accomplish in ten or fifteen years not only guides the combat developments evaluator toward decisive and objective decisions, but also infuses him with a "can do" spirit of confidence. The knowledge, in effect, helps "develop the developer".

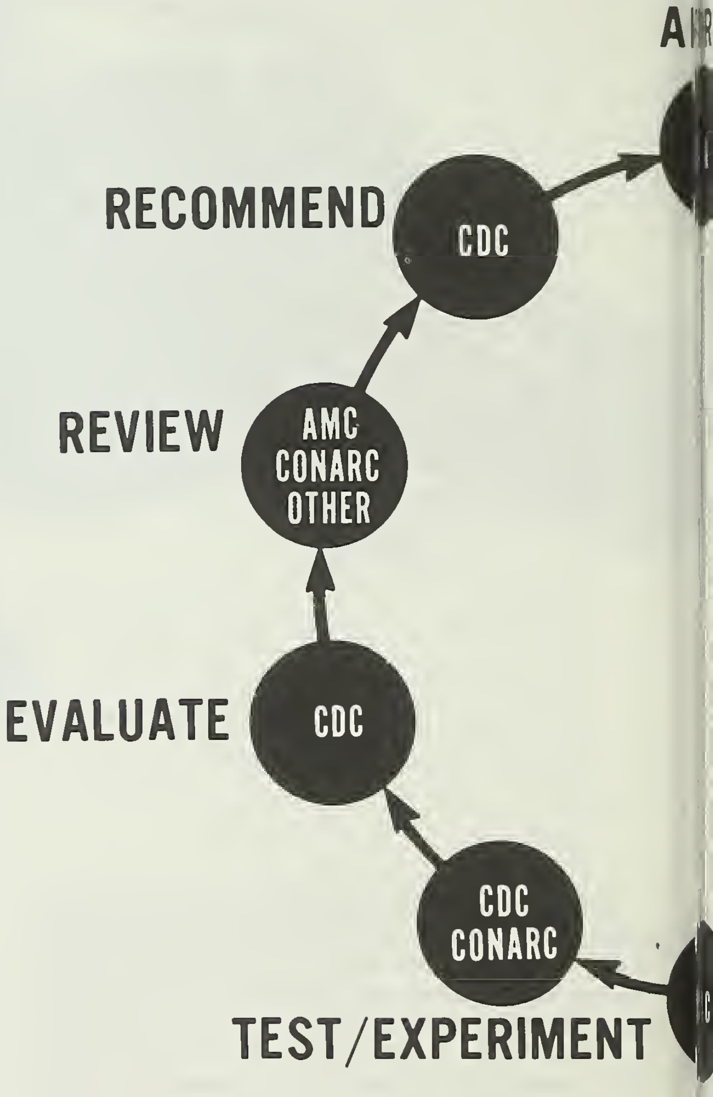
Technological forecasts clear the haze between probability and possibility. Thus the "flying tank turret" example mentioned earlier is not so improbable when related to time, plans, and technological forecasting. The problem may be only one of weight. Knowing the strides made in plastics research and the work being done in ground-zero pressure and ducted-fan vehicles, is this concept now so "way-out"?

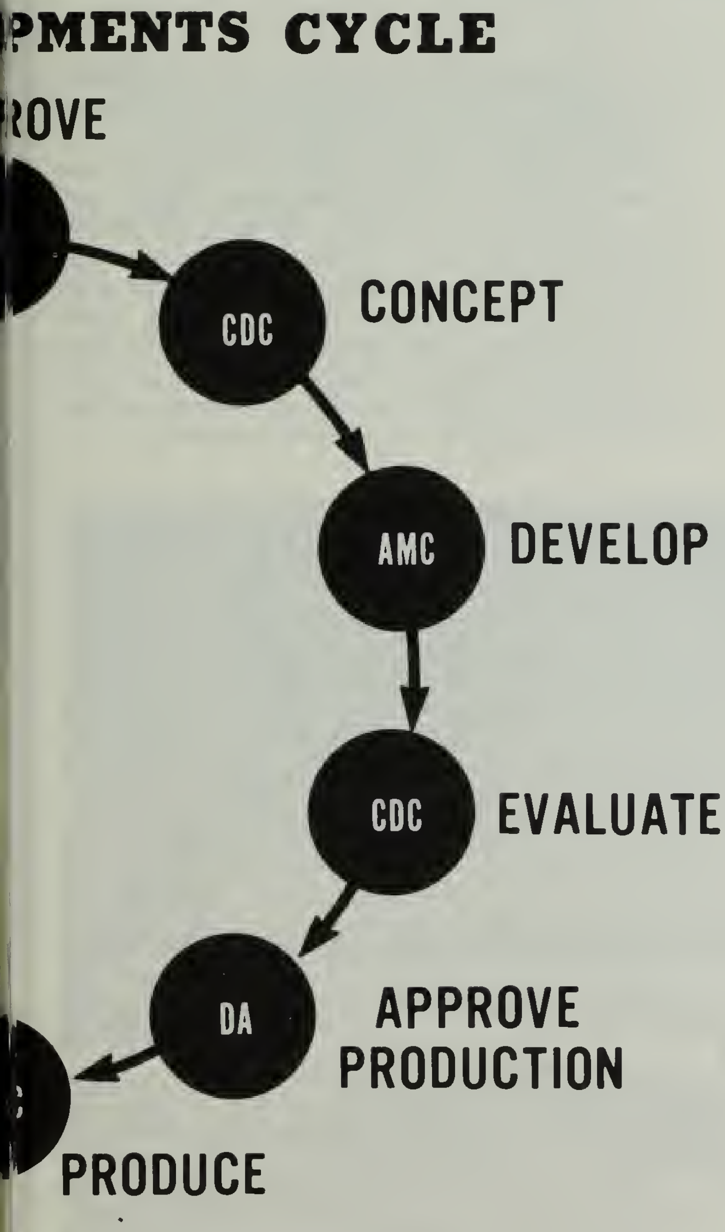
Technological forecasts are based on an honest confidence in the ingenuity and dexterity of American industry. Even the element of chance is in our favor because it accepts the existence of the uniquely native inventiveness of the American searching for something new or improving something old. The chance that an industry may not achieve the required state-of-the-art or technique a combat developments program will require may be neutralized by the opposite phenomenon—namely, the exciting and *unforecasted* possibility of a technical breakthrough.

Combat developers do not live in a dream castle, hoping for sudden research windfalls and startling methods or materials breakthroughs. They do, however, keep intimately up to date in areas where such breakthroughs may come and generally keep their programs poised to exploit in any favorable direction. This flexibility is built into the CDC function which includes maintaining the Combat Developments Objective Guide (CDOG) and making recommendations for Qualitative Materiel Development Objectives (QMDO).

In the QMDO, CDC husbands those ideas and concepts which are not immediately feasible technically but which do have merit, are needed, and are wanted. The CDOG is a "catalogue" of materiel objectives, programs, research, and requirements which correlates combat developments activities with the Army's Research and Development program. These two documents indicate that there are few end-items and services produced in this country that the American Soldier does not utilize in some way.

COMBAT DEVEL





This means combat developments is everyone's business. It includes the efforts of some unknown but determined inventor working quietly in a garage workshop in a tiny village. He can touch off a massive breakthrough equal, perhaps, to anything from the vacuum tube to lasers—so can a physics student in a school lab who may accidentally fuse two like substances to form a combination of startling potential.

New ideas on the organization and operations of the present and future Army are every bit as critical as the need for new materiel. Indeed, it is a convenient fallacy to consider combat developments predominantly from the standpoint of tangible materiel end-items; actually, development of materiel requirements is only a portion of CDC's mission, and may or may not have impact on concepts and doctrines.

As a "bystander's guide" to conceptual thought and developments, what is the best way to nurture a "way-out" idea? Simply, the way combat developers do it—with free, unashamed imagination and confidence in human creativity.

This discussion has emphasized the pre-ideational or genetic stage of combat developments—the first appearance of an idea as a complete intangible, coming into the top of CDC's flow chart. The next steps involve attacks by more specific area (arm and branch) specialists, the fashioning of the idea into a study program, subjecting it to further formal research, and making preliminary estimates as to its technical and fiscal feasibility.

Always it must be recognized that at the first germinal stirring in its life-cycle, the raw idea need not—indeed cannot—be sharp and clear. But while its realization is somewhere out in the future, it must have future merit, or it will have no future.

Simply stated, Combat Developments Command is the Army's "idea-proving-ground". Here embryo ideas are handled calmly and gently by mature specialists, by men of vision who are not visionaries. New approaches and concepts are the raw materials with which these men work to achieve Army combat effectiveness.

Faced with the vagaries of attempting to "see" into the future, with predicting the nature of wars we hope to avoid, and anticipating the creativeness of the human mind, combat developments idea-analysts cannot answer the question, "How far is way-out?" because it instantly poses a second and equally urgent question, "Is it far enough?"

THE INTER-AGENCY ADVISORY COUNCIL

The All-Star Team

"Beyond their deterrent to war, how should tactical nuclear weapons in Europe be used to counter specific Warsaw Pact threats?" This was one of the questions President Nixon asked in 1971.

How do you answer a question like that? No matter what you say, somebody will disagree. If you look at the problem solely from the military angle, the diplomatic issues may be slighted. If you look at the problem as solely political, the reverse may be true. On something as important as tactical nuclear weapons, everybody has to state their opinion. When these opinions appear to be diametrically opposed, how can common ground be found and right and wrong determined?

When CDC's Strategic Studies Institute was given the task of dealing with the overall nuclear question, the solution was this: get all the people who have an interest in the subject together and let them talk to each other and with the study team from the very beginning. Then, if they disagree, they know what they disagree on and why. Not only can this reduce any differences, it opens channels of communication that can be used to solve other problems.

ROOT HALL, named for Elihu Root, founder of the Army War College. The building houses the faculty and students of the Army's senior school as well as members of the Institute of Advanced Studies, part of the US Army Combat Developments Command.

Col. de Moya: "Everybody has said that the Army has really taken the lead in this area."

The formal title for this process is the Inter-Agency Advisory Council (IAC), and it is fast gaining acceptance as a way to assist important and multi-faceted studies.

The IAC is composed of about forty individuals from all parts of the government, including the Secretary of Defense's office, the Department of State, the Atomic Energy Commission, all the military services, EUCOM, USAREUR and USARPAC.

COL Harold deMoya is Director of the study team at SSI that is working on the Tactical Nuclear Operations Concepts study. "We're trying," he said, "to develop a product for the Army that is acceptable politically within the United States government, and which is also acceptable to our allies. There are divergent views on the use of tactical nuclear weapons which arise from different perceptions, points of reference, and conceptions of political and military factors."

Last December the Army conducted a Tactical Nuclear Weapons Symposium which addressed all aspects of this very important subject. Subsequently, the Department of the Army directed CDC to conduct the current SSI study. Concurrent with this, it organized an Inter-Agency Advisory Council. Its main purpose is to guide and assist the study team in addressing this important subject and to provide a forum wherein a frank interchange of views and ideas can and does take place.

"Up until the present," Col deMoya continued, "the IAC has met seven times. We and others have briefed them on what we have been doing in the area of tactical nuclear weapons. Most of the draft papers we complete go out to the members of the IAC for their comment. Recently we conducted a series of political military war games in Washington. We took six different hypothetical situations and tested the study's strategy and options for the tactical use of nuclear weapons. I mention this because a large number of the individuals that participated were members of this Inter-Agency Advisory Council."

"There have been a number of studies in this area that have been done in the past, and there are a number of studies that are going on now. The Department of Army feels that this study is one of the most important because it addresses the area of policy and doctrine for the tactical use of nuclear weapons. This, in turn, should provide much needed guidance for other efforts going on in the field of nuclear operations."

Col. Pizzi: "The thing that makes it great is that . . . we have a fantastic sounding board."

COL Joseph Pizzi, the Deputy Commander of SSI, contrasted this approach with the usual method of conducting a study. "The thing that makes it great," he said, "is that during the course of the study, while we're developing thoughts and ideas, we have a fantastic sounding board. We're able to use the IAC not only to test the validity of our ideas, but we get from them additional insights. We get this during the course of the study."

"This is opposed to the former way, which has been to do the research first, including picking all the brains and books and documents, and then writing the study. When we thought we had the answer we sent it out and said, 'give us your comments.' At this point we were liable to get comments limited to only a few areas, or comments which might cause major revisions. Or we would get into argumentative situations that detracted from the study itself."

"With the IAC we avoid the large bulk of that, because if we've listened attentively, we've heard all the arguments and supporting rationales, analyzed them, and either incorporated the arguments or met the points by the time we get to final publication."

"The price you pay," COL Pizzi added, "is that it takes a lot of additional time and effort. For example, for each IAC meeting the team devotes about a week's effort from the study itself preparing presentations. In addition, several action officers in the Pentagon devote considerable time sending out invitations, making arrangements, setting up conference rooms, and processing comments. You pay a price; it isn't free, but on balance the benefits have and continue to outweigh the price."

THE SUCCESS OF IAC

"Everybody has said," COL deMoya stated, "that the Army has really taken the lead in this area. We think this study is pushing other agencies to do a lot of in-house study on their own in this area."

As General Stilwell, the former DCSOPS, said, "This study, and the IAC specifically, has accomplished the purpose of getting people together and talking; this in itself is a real step forward."

In dealing with a subject as important and controversial as tactical nuclear operations, there needs to be a great deal of communication. The right hand must know what the left hand is doing. The Inter-Agency Advisory Council and CDC's Strategic Studies Institute is helping to accomplish this as well as producing a worthwhile study product.

HUNTER LIGGET MILITARY RESERVATION:

DESIGNING THE FUTURE AMID THE PAST

By John L. Romje

There are 2,450 enlisted personnel assigned to the Combat Developments Command. 92% of these men and women are assigned to the Combat Developments Experimentation Command at Ft. Ord, Calif., or at the Hunter Liggett Military Reservation, which is 55 air miles south of Ft. Ord.

Hunter Liggett Military Reservation is where CDC tests and evaluates the equipment and doctrine that have resulted from CDC studies. It has often been called "CDC's live chess board" because of the many war gaming exercises and field training exercises. Many people have already heard about Hunter Liggett's rough, mountainous terrain, and how great a place it is for testing new ideas. But few know about the history of the area. The men and women who spend each day at Hunter Liggett see the history all about them. But to those of us who have never seen Hunter Liggett and know of it only as a testing ground, the historical features go unnoticed. The Arrowhead *staff believes that the history of Hunter Liggett Military Reservation is of interest to our readers. Modern technology has moved into the area, but the historical aspects of the area are not changed. At Hunter Liggett Military Reservation, the men and women "work for the future amid the past".*

Hunter Liggett Military Reservation spreads across the eastern slopes of the Santa Lucia Coast Range approximately 160 miles south of San Francisco. Measuring irregularly 20 miles east to west and 34 miles in length, it contains 166,535 acres. A crest of peaks exceeding 3700 feet forms the western boundary, while beyond the mountainous northern section, Junipero Serra Peak, at 5844 feet, dominates the region. High hills to the east and south contribute to form the general bowl shape of the reservation.

Two seasonal rivers, the Nacimiento on the West and the San Antonio on the east drain the reservation from northwest to southeast. Both empty into and give their names to large lakes on or just beyond the reservation's southern boundaries, ultimately entering the upper Salinas River.

Mr. Romje is currently assigned as the Historian at the Combat Developments Experimentation Command at Ft. Ord, Calif.

LT GENERAL HUNTER LIGGETT. The military reservation was named for this brilliant military man who directed the First US Army operations during the final Meuse-Argonne Offensive in World War I.

The reservation occupies a region with a long and vivid past. Today, as throughout the past 200 years, its focal point is the valley of Spain's first inland settlement in Alta (upper) California during the colonization drive northward from the Pacific ports of New Spain that commenced in 1769. That year, the soldier Gaspar de Portola led an overland party up the

THE HACIENDA, once one of the William Randolph Hearst Ranch Houses, provides recreational facilities for military personnel and quarters for Senior Officers and NCOs as well as visitors to the Field Laboratory.

coast and passed through the valley enroute to the search for Monterey Bay and to the first discovery of the Golden Gate. In 1771, Fray Junipero Serra, driving force behind the joint missionizing-military expedition, returned to the valley and established the Mission of San Antonio de Padua. It was, after those at San Diego and Monterey-Carmel, the third of 21 Franciscan outposts established between 1769 and 1823 by Father Serra and his followers between Baja California and the upper San Francisco Bay.

Around crude brushwood structures constituting the first Mission San Antonio, the Spanish padres set about converting the primitive Indian bands and developing the land. By 1790, over 1000 Indian "neophytes" were at work under the Spaniards' supervision cultivating irrigated crops of corn and wheat and herding cattle driven overland from New Spain. In 1813 the mission building that exists restored today was completed. The mission was at the height of its prosperity. It possessed a water-powered mill and large granaries. Daily activities included saddle-making, carpentry, blacksmithing, tanning and weaving. An early padre, Buenaventura Sitjar, drew up a vocabulary from the native tongue and devised an Indian catechism.

Political tides affecting Alta California soon brought change to the pastoral San Antonio. When Mexico seceded from the Spanish Empire in 1821, the missions came under Mexican rule. In 1834 the new egalitarianism of the Mexican Government led to a decree secularizing the San Antonio and other missions. Stripping the Franciscans of authority over the neophytes, the decree caused general spiritual and economic collapse. The Indians scattered and the mission

THE CDEC SOLDIER, whether an infantryman in the summer dust of Hunter Liggett or its winter mud . . . whether a computer operator, a psychologist, a mathematician, an engineer or a small arms expert, he works toward a single goal: An Army that can win today or tomorrow, anywhere in the world.

lands were divided among several California and a few Indian grantees. In 1842, the mission itself was put up for sale.

Cattle ranches had followed the padres into the San Antonio Valley in the 1820's and during the 1840's and 1850's they became the dominant economic force. The arrival of the first American overland party in California in 1841 augured further social and political change. The American conquest in 1846–7 led to United States sovereignty in 1848 and to California statehood two years later.

As American settlers entered the valley, land title disputes—a California-wide phenomenon—arose. Many Indians, squatters and small ranchers were dispossessed of lands held under old Spanish and Mexican grants. A few Indians found work as vaqueros on the cattle ranches, while others resumed a nomadic life in the mountain canyons.

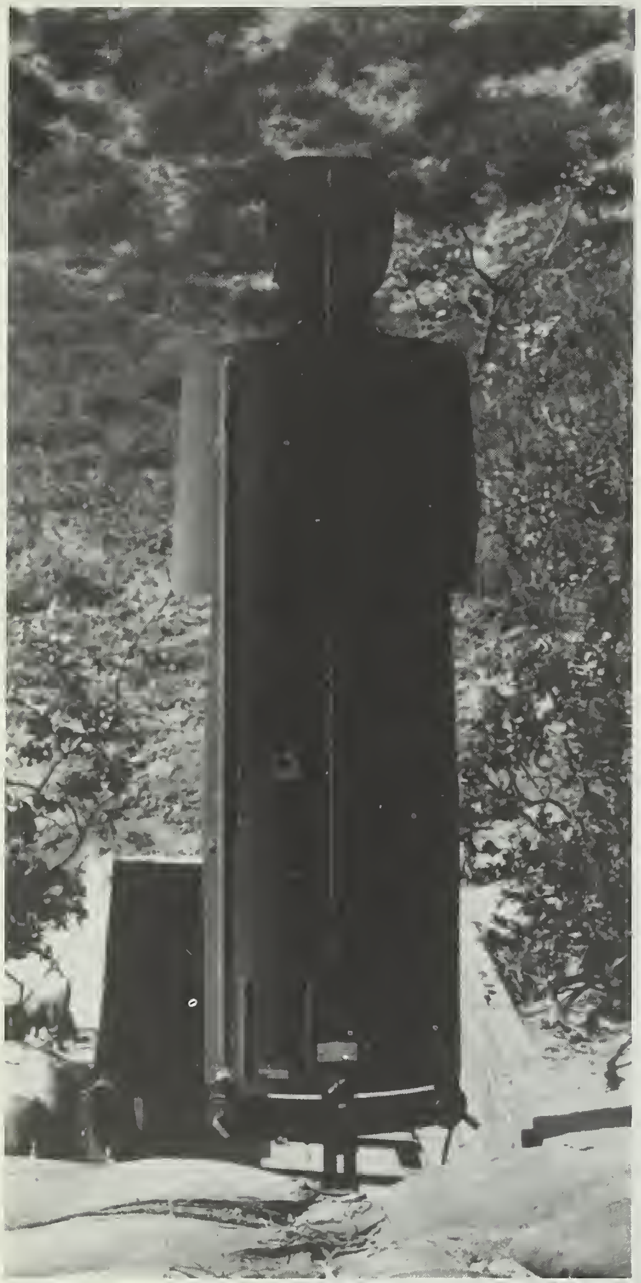
Following the Civil War, the town of Jolon grew up to become the center of community life. At its height in the 1880's, it boasted hotels, saloons, blacksmith shops, a dance hall, jail, stores, a tiny "China Town" and a baseball team. Hold-ups of the King-City-Jolon stagecoach by the notorious California outlaw, Tiburcio Vasquez, completed the Old West flavor. It is reported that Vasquez, after robbing the stage and discarding his mask, hastened to Jolon, greeted his arriving victims with drinks and sympathy at the hotel bar, and rode out with an angry posse to seek the bandits.

Bypassed by the railroad in 1886, Jolon thereafter receded economically. It was not until 1925 that the fortunes of the San Antonio Valley took their next decisive turn. That year, Publisher William Randolph Hearst bought up several large and small ranches in the area, adding them to already extensive holdings in the Southern Santa Lucias. As cattle replaced people, civic life continued in decline. In 1929, much of the town of Jolon, now on Hearst lands, was razed.

In 1930, Hearst completed the second most significant structure in the valley, a ranch headquarters complex of "mission-style," domed and arcaded, known as the Hacienda. The ranch employed a 30-man complement of cooks, laborers mechanics, gardeners, irrigators and cowboys.

The year 1940 brought far more drastic change. Following extensive land purchase by the US War Department of Hearst and other

VISITORS FROM ABROAD travel by the hundreds yearly to visit CDEC, such as the British Liaison Officer from Ft. Leavenworth, Kansas, who is receiving a briefing on Live Fire Range Targets.



ELECTRONIC ENEMY. Hunter Liggett ranges are scientifically instrumented with hit-sensitive targets such as these. Appearing with unexpected suddenness, they add realism to combat scenarios. Small arms fire simulator at lower left can be programmed to audibly simulate rifle, automatic or machinegun fire.

holdings, including most of the San Antonio and Nacimiento Valleys, the region was reconstituted in September as Hunter Liggett Military Reservation. As troops arrived in 1941, it served as a maneuver area and artillery range for recruits from Fort Ord and Camp Roberts and San Luis Obispo. At this time, many of the historic ranch houses and adobes were destroyed. The Army converted Hearst's Hacienda into reservation headquarters.

The new reservation's title honored World War I soldier, Lieutenant General Hunter Liggett, who commanded successively the First Army Corps and the American First Army in France. In a long and varied career, Liggett had also served in Cuba and the Philippines.

It was one of history's smaller ironies that the lands of Hunter Liggett Military Reservation were, in the immediate years following World War II, emptier and more isolated than at any time since their settlement. In the late forties, the reservation saw little military use. At the same time, attempts to restore Mission San Antonio which had begun when the Franciscan Order reopened the mission in 1928, had met little success. It was not until 1948 that this activitity resumed in earnest. That year, former valley resident, Hearst, established a half-million dollar foundation to restore the San Antonio and other California missions. In 1948, the badly deteriorated structure acquired its first resident padre in nearly seventy years. By the 1960's restoration was well completed.

The very isolation and postwar emptiness of the mountain valleys, however, proved to be among the soundest arguments for the Army's selection of the reservation as the field laboratory site of the new Combat Development Experimentation Center (the present Combat Developments Experimentation Command, CDEC) activated with headquarters at Fort Ord in November 1956. CDEC's tenancy opened the most recent chapter in the region's history. There the great preponderance of combat developments field experiments—down to the present time—were fielded.

For many reasons, the Army's choice of Hunter Liggett proved to be a good one. Within and over its large confines not only infantry and armor experiments but artillery and aircraft experiments as well could be staged. Its remoteness facilitated the restriction of its air space, discouraged competitive use of its terrain, minimized problems of ambient noise and radio interference, and shielded the reservation's night experiments from significant sources of artifi-

AN OLD MISSION stands on Hunter Liggett, much as it was in California's early history. The Franciscan Brothers who occupy it welcome CDEC Soldiers to services.

cial light. Its sharply varied terrain and comparatively mild climate permitted the realistic staging of experiments under diverse conditions of combat year-round. In all, the reservation furnished the Experimentation Command a panorama of natural advantages difficult and probably prohibitively expensive to acquire or maintain elsewhere.

Adjoining the Hacienda, a field headquarters of temporary structures was completed in 1959. In the mid-sixties, groups of hutments sprang up at several bivouac areas. Construction of limited permanent facilities began in April 1969. Of more significance was the reservation's network of complex instrumentation systems for sensing, recording, controlling and reducing experimental data.

Increasingly during the 1960's, CDEC's experiments provided empirical laboratory data to provide answers to current operational problems such as the best distribution of weapons in small tactical units and the vulnerability of helicopters to anti-aircraft fire. Future tactical concepts and organizations were being studied in wide variety as CDEC ended its sixteenth year in late 1972.

The Commander and the Computer

AUTOMATED DECISIONS

By Christmas A. Malami

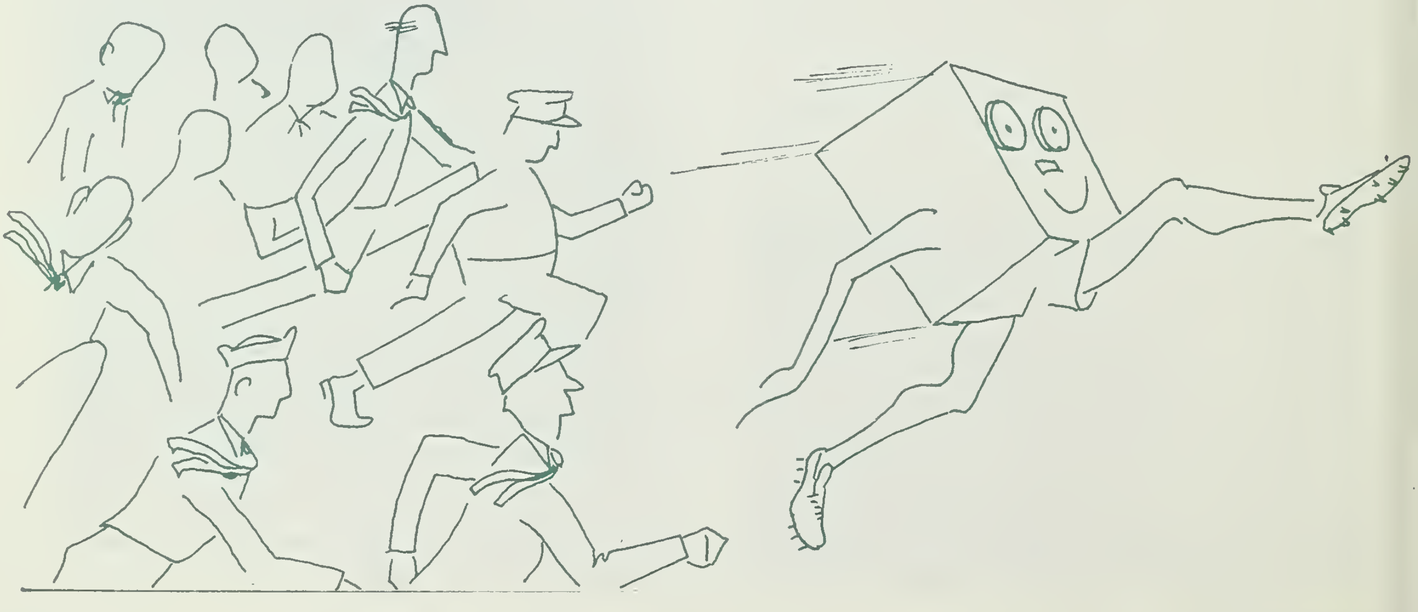
Since the advent of the computer, the commander and the computer people have worried that the machine would replace the man. With the application of computer technology to military command and control, the question becomes: Can the computer replace the commander? Who makes the decisions? How are they made?

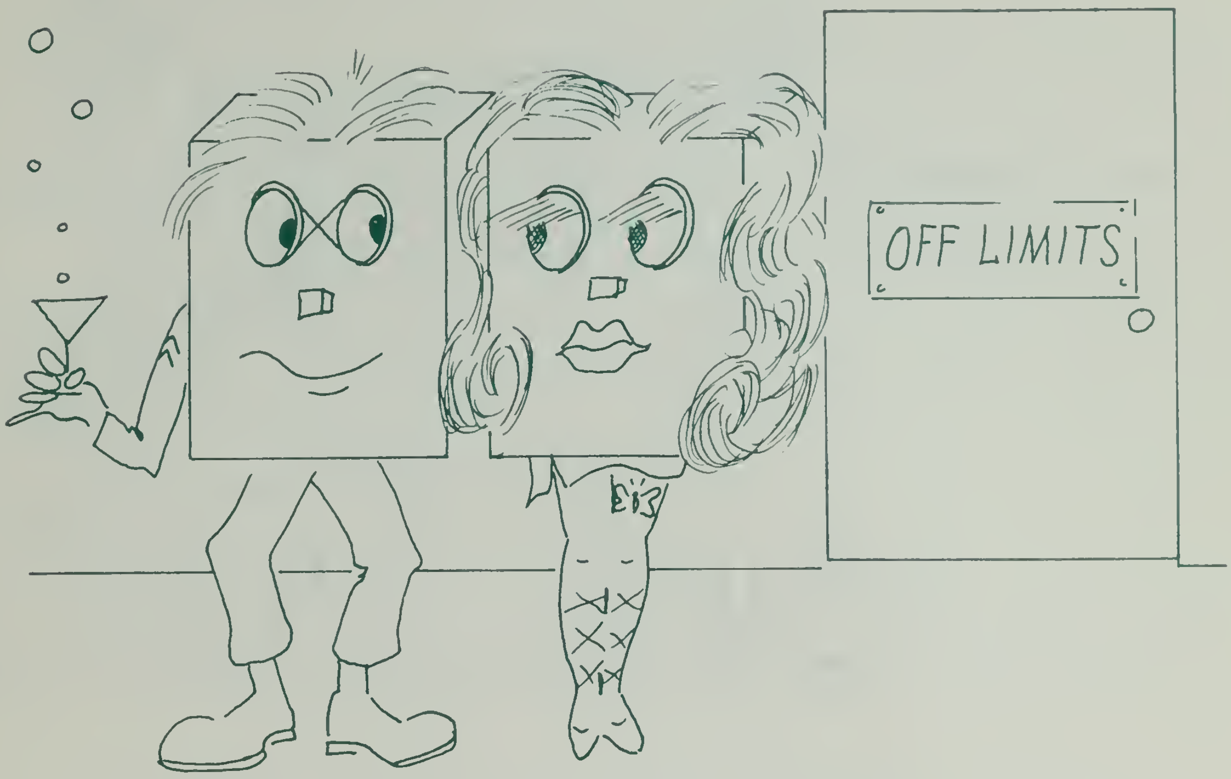
The Integrated Battlefield Control System (IBCS) is designed to increase operational and command and control efficiency in tactical operations through the introduction of automatic data processing into what is essentially a manual environment. This gives the commander and his staff the capability of considering, on a near realtime basis, all essential items of information bearing on a proposed action. Thus a more rapid, accurate, timely, and considered decision can be made. The capability to rapidly give instructions and coordinate actions should further increase efficiency on the battlefield. The commander remains, however, and he will utimately make and assume responsibility for the actual decision.

Mr. Malami is an equipment specialist in the Materiel Systems Division at the CDC Transportation Agency, Ft. Eustis, Va.

The computer can furnish the commander with information identifying shortfalls in performance or status; i.e., compare actual performance or status against standards and give warning when variances are noted. This technique, management by exception, reduces the value of information that the commander or his staff must manually and mentally evaluate before making a decision. Logically, then, using this process would contribute to a faster, decision process than was previously possible. If a cybernetic system is used, (which is a method of looking at the output of a system, comparing it

THE COMPUTER IS FASTER THAN A HUGE STAFF



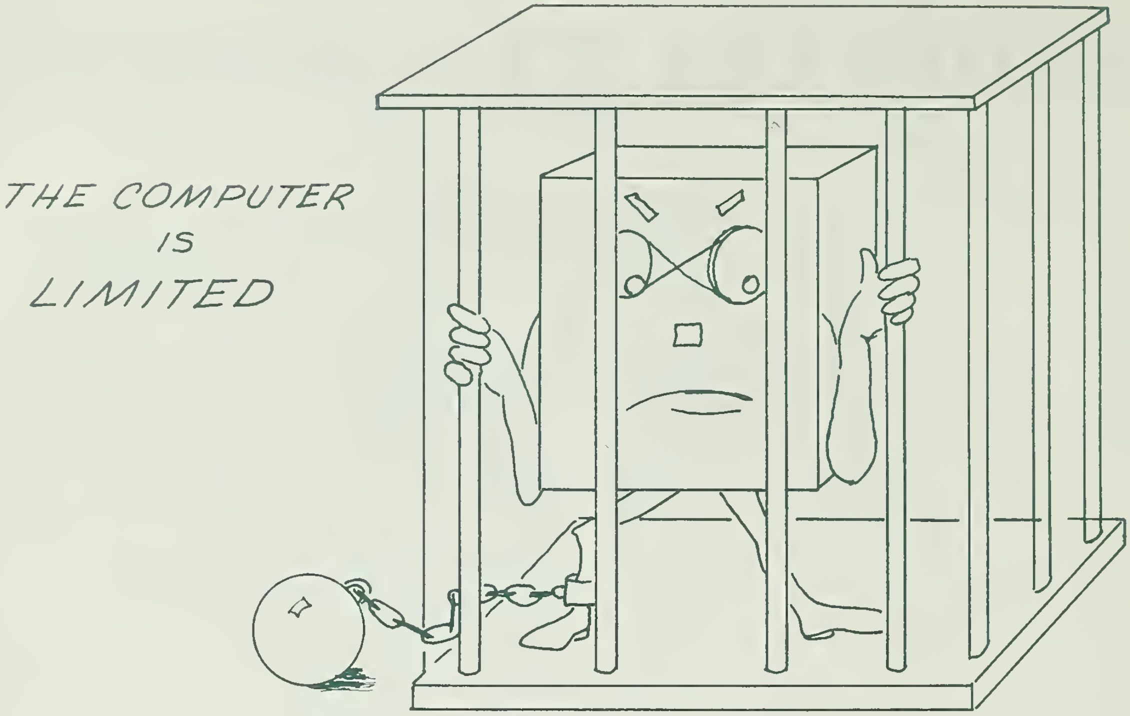


THE COMPUTER HAS NO MORAL VALUES

with a desired norm, and actuating a control mechanism to adjust the system to a desired norm) the decision process would be speeded even more as decision choices would be further reduced. At this point, however, we begin to recognize that the system designer who is allowed to specify the range of phenomena that a system will distinguish possesses a tremendous degree of power. He may be indirectly usurping part of the decision-making prerogatives reserved for the commander. This subtle danger is not limited to management by exception but may include the entire data processing system.

This problem which might be called involuntary delegation of authority, results from two basic characteristics of the computer system. One, it has finite limits for data storage and processing and, two, it cannot measure intangible factors such as good-will, human behavior, moral values, or human ethics. The finite limits eventually result in restrictions on the alternatives available. Within these restrictions we may only present the most logical or rational alternatives available. The computer at some point in time must be provided reality reduced to binary form. But individual human behavior is not always rational, or even logical, when viewed by an outside observer, and even though future computer systems are likely to match, stimulate, or surpass some of man's most human-like intellectual abilities, including perhaps some of his aesthetic and creative capacities and emotional responses, this time has not yet arrived. Therefore, even when the designer of a system is forced to rely on military judgment to insure that an appropriate decision is made in every case, the decision may not be that of the commander who will ultimately hold responsibility for the final outcome.

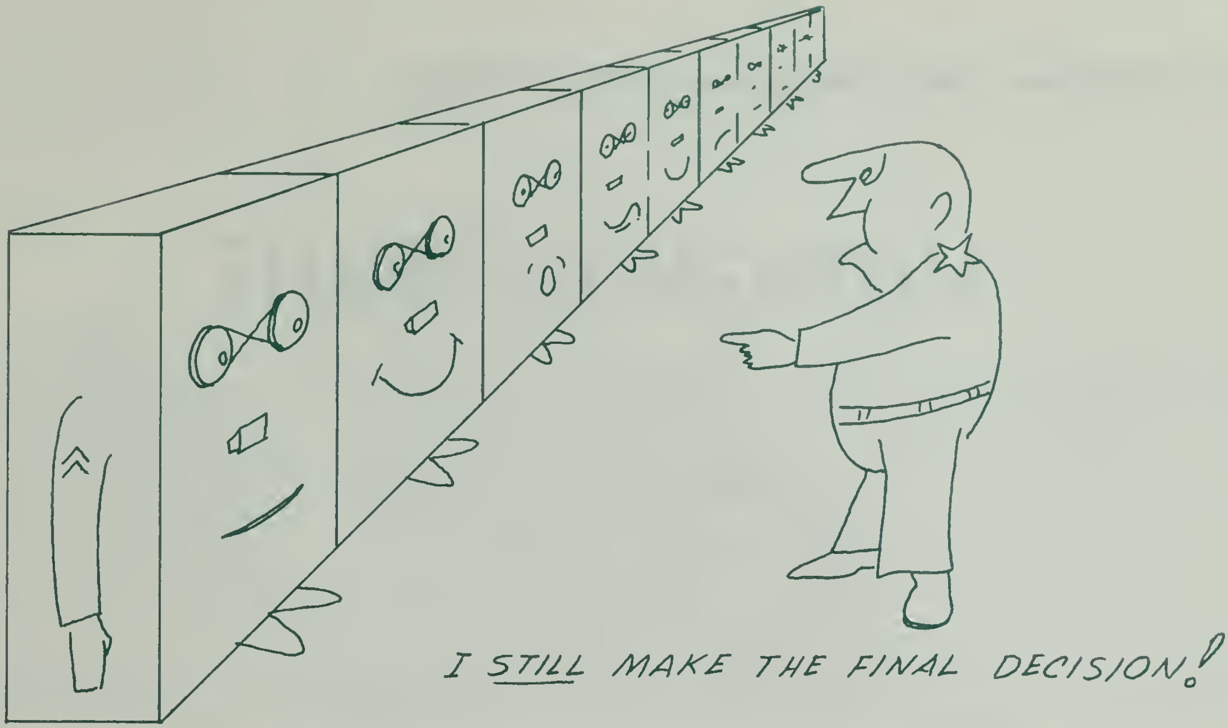
A solution to the problem becomes very im-



portant when we return to the proposed result of the Integrated Battlefield Control System: a rapid, accurate, timely, and considered decision. An automated system without the restrictions mentioned could provide a volume of information impossible to manipulate. At the same time the restrictions placed on the available alternatives may eliminate that one course of action, perhaps illogical to the designer, that would provide the best solution to a problem. Therefore, a decision that is equally rapid, accurate, timely, and considered is a restricted decision, and is based on the value judgments of several people, not just the commander.

Even with all these faults, however, the automated system still provides us with an increased capability for operational efficiency and command and control in tactical operations. The key to reduced volume and intangible considerations is in providing only essential items of information. If we look more closely, we find that the determination of what is essential and what is not has long been a delegated authority of the commander.

Technological advances have introduced a variety and complexity of information into the military system that no single mind can be expected to cope with. Up until now an elaborate staff system has screened information at varied levels through the military structure. Alternative courses of action were eliminated, perhaps relying on far less experience than it is now possible to use. The automated system, on the other hand, provides us with a capability to use standardized internal decisions, based on the expert judgment of many people, in our determination of what shall be labeled essential. In either case the commander does not receive raw data, but only that information felt by others to be necessary for him to make a proper decision. In either system


I STILL MAKE THE FINAL DECISION!

he can request more detailed information if necessary. The automated system can handle a greater volume of information.

This increased volume becomes more a reality with each passing day. Of equal importance is the fact that the automated system can provide this capability while reducing actual staff size.

It is interesting to note that Soviet discussion related to automation in the area of troop control very closely parallels our own problems. As an example, the Soviet Air Defense Command most readily accepts an engineering concept of command, as did our own field artillery's TACFIRE system show us that battlefield automation was indeed possible.

In both the U.S. and Soviet systems there is the genuine argument on the role of intuition and experience in command decisions. There is an additional Soviet fear that command and control may be removed from politics should it become a purely technical undertaking. The Soviets search for a more scientific selection of data to be automated, while we attempt to isolate minimum essential items of information. Finally the Soviets, perhaps more than we, recognize that many of the fears and much of the skepticism regarding tactical automation results from a lack of technical training and engineering backgrounds within these systems.

No matter what scientific, technological, and organizational advances are made, the final decisions involving the use of military power still has to be made by the commander. Though the Integrated Battlefield Control System may help to more clearly define the desired objective or more precisely calculate the risks associated with the decisions, the exercise of authority and assumption of responsibility still rests with this one individual. This concept has not changed.

The Problems with Helicopter Cargo Slings

HANGING TIGHT

By Major Walter J. Chrobak

A Summary of Helicopter External Cargo Sling Equipment Problems

Aerial delivery slings and the universal sling set are the only items presently available for transporting helicopter external sling loads. Rigging lightweight loads with this equipment has been relatively uncomplicated. However, sling load weights have increased, and double slings are required to accommodate heavier and more complicated loads. Doubling of slings to increase their lift capacity and lack of proper external sling suspension points on Army equipment to be lifted have made load rigging complex, difficult, and time consuming. Additionally, rigging loads with aerial delivery slings and universal slings requires the use of numerous small hardware items such as clevises with nuts, bolts, and link assemblies. Load oscillation and vertical bounce are also being experienced with the universal slings and aerial delivery slings during flight, which result in sling wear (Figure 1) and loads being dropped due to sling breakage. There are also instances where pilots have deliberately released an airborne load due to high vibrational frequencies induced by vertical bounce and load oscillation. A new family of helicopter slings is required by the Army to fully exploit the combat service support capability of the helicopter.

Cargo nets presently used for handling helicopter external loads were developed for use in stevedore and airborne operations. This type equipment is inadequate because it lacks sufficient structural strength, operational flexibility, and capacity to accomodate the helicopter external loads which will be moved by Army helicopters in 1975–85 time frame.

Review of operational information from the Republic of Vietnam indicated that cargo nets, equipment, and procedures for handling bulk supplies transported by Army helicopters are inadequate. Lack of adequate equipment has resulted in local fabrication of items such as wooden boxes to fill the void. These locally fabricated items are of questionable adequacy and safety, and they are also excessively heavy.

Operating problems associated with helicopter external cargo handling equipment began emerging during 1963 and 1964 when the CH–47 helicopter was introduced into the Army inventory. These problems became magnified and more evident with the passage of time and the operational experience acquired in Southeast Asia. Consequently, during January 1968, the US Army

Major Chrobak is currently assigned to the Military Police Agency, Fort Gordon, Georgia

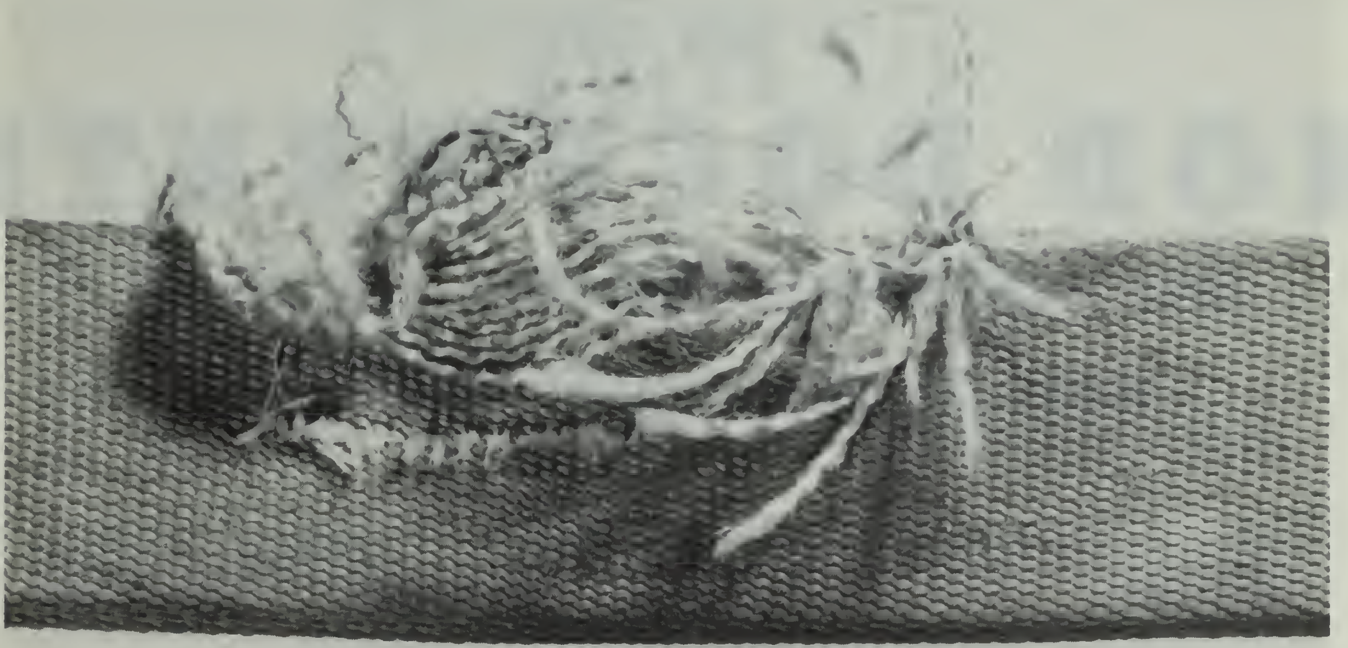


Figure 1. Example of worn helicopter external cargo sling resulting from use in Vietnam

Combat Developments Command Transportation Agency prepared materiel need documents which are aimed towards solving many of the problems identified in this paper. A summary of these requirements documents follows:

a. Materiel Need, Family of External Helicopter Slings, 5,000- to 60,000-Pound Capacity. The requirement exists for a new family of slings for transporting cargo as helicopter external loads. The new family of slings will be used to transport cargo as external loads by Army utility/cargo helicopters in weight categories of 5,000, 10,000, 25,000, 50,000 and 60,000 pounds. The family of slings will be suitable for use with current utility/cargo helicopters, the heavy lift helicopter and the utility tactical transport aircraft which are projected for development during the 1975–80 time frame.

b. Materiel Need for a Family of Helicopter External Cargo Carrying Devices. The requirement exists for a family of cargo carrying devices to be used for transporting cargo suspended externally from Army cargo and utility helicopters. The devices will be used to transport individual cargo loads in weight categories ranging from 2,000 to 20,000 pounds. The devices will be suitable for use on an interchangeable basis with cargo and utility helicopters currently in the Army inventory and with helicopters projected for development during the 1975–80 time frame. The family of devices will contain all components required to safely suspend helicopter external loads during flight.

The presently used helicopter external slings were designed with old technology which dates back to World War II. Application of new materials and technology should permit the development of a new family of helicopter slings and cargo carrying devices which will be stronger, lighter in weight, and lower in cost. Equipment meeting the requirements identified in this paper is urgently required.

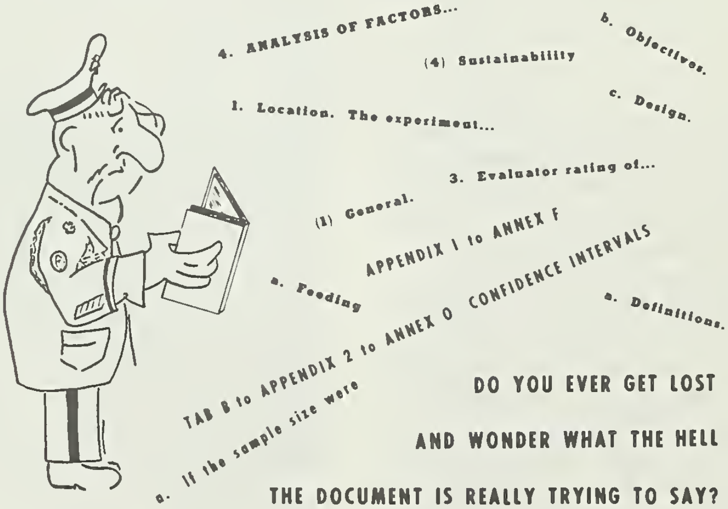
A NEW IDEA

MOD DOCUMENTS

CDEC IS EXPERIMENTING WITH THE USE OF MODULAR PUBLICATION TECHNIQUES

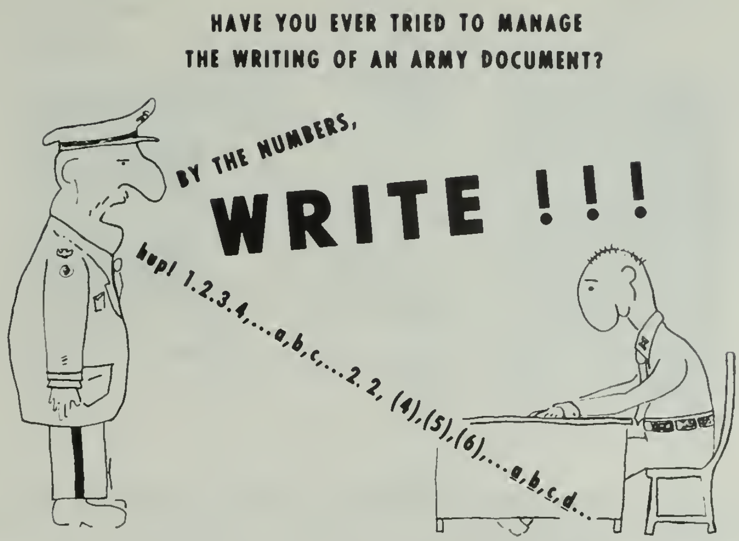
Editor's note: This article was originally given as a briefing to a CDC commander's conference by BG Ochs, commander of CDEC. Because of its general interest we are reprinting it in the *Arrowhead.*

HAVE YOU EVER REALLY TRIED TO READ AN ARMY DOCUMENT?

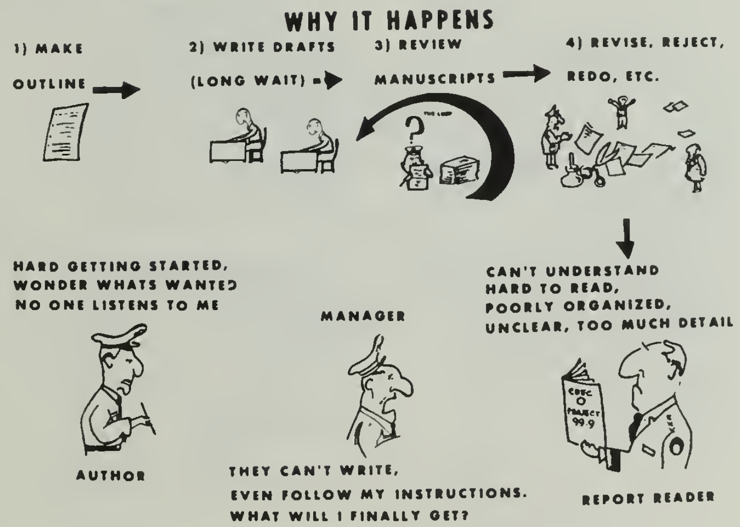

4. ANALYSIS OF FACTORS...
(4) Sustainability
b. Objectives.
1. Location. The experiment...
c. Design.
3. Evaluator rating of...
(1) General.
APPENDIX I to ANNEX F
a. Feeding
CONFIDENCE INTERVALS
a. Definitions.
TAB B to APPENDIX 2 to ANNEX O
a. If the sample size were

DO YOU EVER GET LOST
AND WONDER WHAT THE HELL
THE DOCUMENT IS REALLY TRYING TO SAY?

Do you ever get this feeling? Sometimes I think our style of writing has overwhelmed us. We end up with documents which are difficult to read. Clear concepts, ideas, data, and results sometimes get lost in our paragraph, annex, appendix, tab systems.


HAVE YOU EVER TRIED TO MANAGE
THE WRITING OF AN ARMY DOCUMENT?
BY THE NUMBERS,
WRITE !!!
hup! 1.2.3.4,...a,b,c,...2. 2, (4),(5),(6),...a,b,c,d...

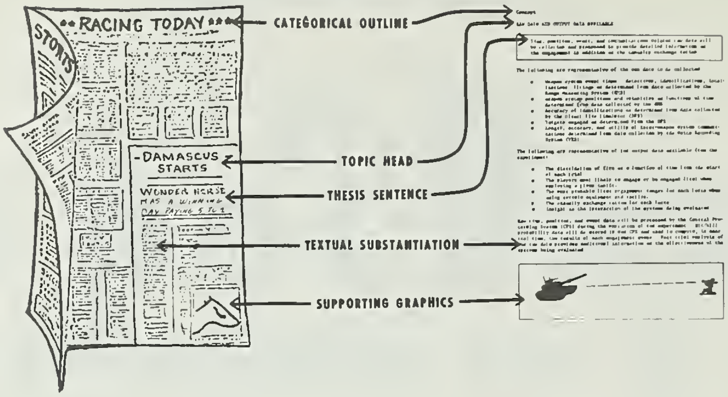
We tend to manage the production of documents by the same system. We count cadence and hope for the best.



Lack of early comprehensive management review is the principal cause of the problem. After the outline and a long wait, authors generate draft material. This is the first time that management gets an indication of whether their instructions on content, focus, etc., ever got across to the contributors. Almost always, we get into a loop trying to correct for misunderstanding on the part of management and contributors. The quality of the final document depends on the amount of time spent in the loop. Often the results are less than desirable.

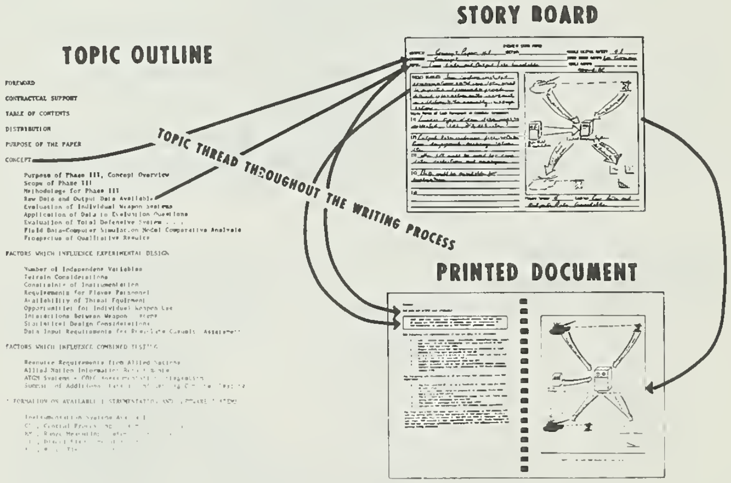
Industry has the same problems, and Hughes Aircraft was the first to do something about it. They analyzed numerous technical reports and proposals. They found that on the average, authors write 500 words to a topic. They then set about designing a publication system around this fact. They first applied the method to proposals and found their contract capture rate increased. They then adopted the method to all of their documents and reports. Most of the other major aerospace firms soon followed.

ITS LIKE NEWS PAPER COMPOSITION



The method is not unlike newspaper composition, where things are divided into categories, topics followed by thesis sentences which summarize what is to be said about the topic, and then supporting text and illustrations.

TOPIC THREAD


STORY BOARD
TOPIC OUTLINE
FOREWORD
CONTRACTUAL SUPPORT
TABLE OF CONTENTS
DISTRIBUTION
PURPOSE OF THE PAPER
CONCEPT
Purpose of Phase III, Concept Overview
Scope of Phase III
Methodology for Phase III
Raw Data and Output Data Available
Evaluation of Individual Weapon Systems
Application of Data to Evaluation Questions
Evaluation of Total Defensive System . . .
Field Data-Computer Simulation Model Comparative Analysis
Prospectus of Qualitative Results
FACTORS WHICH INFLUENCE EXPERIMENTAL DESIGN
Number of Independent Variables
Terrain Considerations
Constraints of Instrumentation
Requirements for Player Personnel
Availability of Threat Equipment
Opportunities for Individual Weapon Use
Interactions Between Weapon Systems
Statistical Design Considerations
FACTORS WHICH INFLUENCE COMBINED TESTING
Resource Requirements from Allied Nations
TOPIC THREAD THROUGHOUT THE WRITING PROCESS
PRINTED DOCUMENT

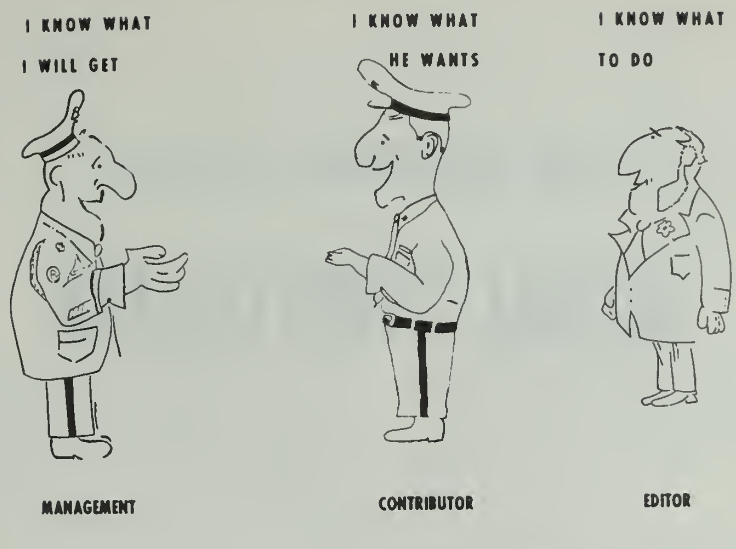
The process goes like this: management makes up a categorical outline. Within each category, topics are defined. Story boards are then produced. These include the thesis sentence, that is what you are saying about the topic, using verbs, adjectives, etc., to state the who, what, when, and where and why of the topic.

The point of each supporting paragraph is then added as well as a sketch of the art work. The modular publication places a heavy emphasis on art work since literally thousands of words can be replaced by one good picture.

The story board is the management review instrument. When management is satisfied that the author has the right idea, he approves the story board for draft and final writing. Note how the topics follow throughout the process. The thesis sentence remains fixed and is boxed or emphasized in the final document.

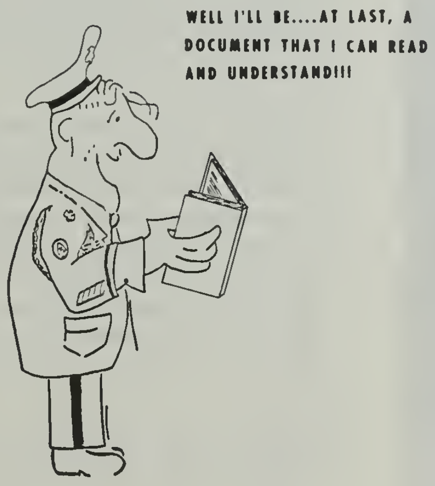
It turns out that 500 words and art work fit on two pages. These two pages as shown here are called a module. Transition between modules is minimal since each develops a unique topic.

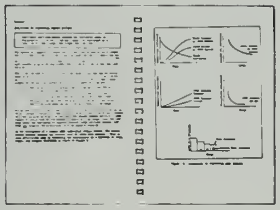
IMPROVED MANAGEMENT

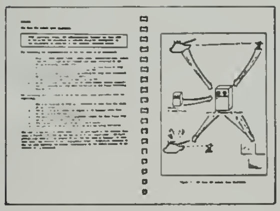

I KNOW WHAT I WILL GET
I KNOW WHAT HE WANTS
I KNOW WHAT TO DO
MANAGEMENT
CONTRIBUTOR
EDITOR

Management can see what the total document will be. Applying the modular publication technique results in a more efficient and effective use of manpower. Management of document production is greatly improved.

IMPROVED DOCUMENTS


WELL I'LL BE....AT LAST, A DOCUMENT THAT I CAN READ AND UNDERSTAND!!!





You end-up with a document that can be read and understood. The executive may quickly get a comprehensive summary of the document by leafing through the document, reading only the thesis sentences, and viewing the art work.

CDEC first tried modular publication on their Experiment 11.8, Phase III, Concept document. They were very satisfied with the results. They are now preparing story boards for other experiments and hope to publish them in the modular format.

CDC BRIEFING TEAM

GLOBAL STORYTELLERS

Staff Sergeant Dugan R. Ersland conducts a confidential briefing at Ft. Leonard Wood. Mo.

The house lights dim. A voice booms in the darkness.

"Gentlemen, the United States Army Combat Developments Command presents—Vision to Victory!" A movie flashes on the screen. Rock music is heard. The briefing has begun. It is the United States Army Combat Developments Command's" Army of the Future" Briefing Team, a five-man team of officers and enlisted men out to tell the Army Combat Development story throughout the world.

CDC's Commanding General, LTG John Norton, once said, "If we are going to have an all volunteer Army of well qualified professionals, our Soldiers must be told what kind of Army they can expect. And the Soldier can play an important part in shaping that Army."

As recently as one year ago, a survey showed that less than 6 percent of the E–7s and E–8s in our Army knew of the Army's effort in planning for the future and, specifically, the existence of CDC and its key role in that effort. Strongly supporting the concept of the Soldier playing a vital role in shaping the modern Army, CDC established, in October 1971, the "Army of the Future" Briefing Team. Its purpose: to tell the CDC story throughout the world and get the ideas, suggestions, and comments of the Soldiers in the field so our Army can better plan for the demands of the future.

The assignment is a tough one but it has been effective. One look at the map that hangs in the office of Major William McCluskey, the team coordinator at HQ, CDC, illustrates the areas that have been visited by the team. One sees map markers on every major CONUS active Army installation, many reserve unit summer training installations plus installations in Europe, Alaska, Korea, Japan, Okinawa and Hawaii. In all, 115 "Army of the Future" briefings have been presented at 80 separate installations. Presenting to audiences ranging from a small group within sight of the DMZ in Korea to over 1000 in one day at Fort Lewis, Washington, the CDC "Army of the Future" Briefing Team has, to date, reached 22,000 US Army personnel.

"Sometimes you feel like your home of record is a motel and your office a B–4 Bag," said Major Crouch, who served as a team member during a tour of major CONUS installations covering 50 briefings at 34 installations during the period February thru April 1972.

Twelve officers and NCOs, all of whom were selected from CDC units have served with the "Army of the Future" Briefing Team for periods normally ranging from 4 to 6 months. Team members are normally changed during non-travel periods at times of briefing up date and rewrite. Only one team member, SSG Dugan Ersland, has been with the team from the beginning.

"It was amazing how many men at the various posts we visited didn't even know what CDC was," said SSG Ersland. "Many times after the briefing, a Soldier would come up to me and say, 'Hey that's fantastic! I never knew the Army looked that far ahead. I didn't know the Army had such an organization as CDC. That's really something!' When I hear comments like those, I know what we're doing is really worthwhile."

The team tries to go where the men are. They make every effort to present the briefing wherever requested.

"In the past, it was the various headquarters staff personnel who received the briefings on what is in the future of the Army. Now the CDC briefing team is reaching the young officers and enlisted men," said Major Arne Moi, who headed the team during a May thru August 1972 tour of reserve units. "What we are doing is spreading the story of Army Combat Developments throughout the Army. We are telling these enlisted men and young officers what CDC is doing, how CDC is doing it, and what CDC is developing for them for future use," Major Moi continued.

In Europe, in November thru December 1971, the CDC briefing team visited 26 separate installations. Close to 3500 members of VII Corps, V Corps, and the Berlin Command had the opportunity to see and hear about the new developments for the Army.

"The European Tour was really great," said SSG Ersland. "The men in Europe are really away from the planning that takes place in the States. I got the feeling they really appreciated the fact that someone was telling them what was going on and letting them have their say about it."

Communications with the Soldier is one key objective to the Army of the Future Briefing Team. The briefing illustrates what is being planned for the future; the team solicits the Soldiers ideas on these plans. In doing so, the CDC briefing team establishes a communications channel for the Soldiers in the field who are concerned with what our Army is developing for their use in the future.

"Establishing rapport is essential if the Soldiers are going to open up," says Major Kenneth Scott, team member during the September thru October 1972 tour of Alaska and the Far East. "One of the things that has been beneficial is our experience from visiting the various installations. We are able to discuss types of facilities, housing availability, and other areas of interest with the Soldiers, especially those on orders. These facts help to establish a degree of empathy for the men we talk to."

Traveling throughout the world, the CDC briefing team has made presentations from facilities varying from the austere to the elaborate. "We must use the equipment made available to us by the host installation," related SSG Ersland.

While another team member presents part of the briefing, Major William Crouch, Major Morris McDaniel, and Master Sergeant Elmer Galloway pepare the projector for a film on new developments in the Army.

"I remember in Germany we gave the briefing in an old airplane hanger. If the briefing didn't hold the interest of the Soldiers and keep them awake, the cold wind rushing through the openings in the wall surely did."

The team emphasizes that Combat Developments is everybody's business in the Army. To insure that the Soldiers are able to take part in what our Army is doing, several alternatives are offered to the men. To get their opinions and ideas heard by the Army, the Soldiers can contact directly the CDC agency involved in that area of interest to the Soldier. For example, if the area of interest is in tank weapons, the Soldier can write directly to the CDC Armor Agency at Ft. Knox, Ky. The briefing team lets the Soldiers know where to submit the ideas and questions regarding their areas of interest.

Another alternative is the Army Sounding Board for the Individual Soldier at Ft. Benning, Ga. This board analyzes ideas and suggestions from Soldiers in the field. The board has handled ideas on everything from ammunition to zippers. If the idea submitted to the Sounding Board is a good one, the Soldier receives a cash award for the idea.

At CDC Headquarters at Ft. Belvoir, Va., another means of getting ideas across is available. A special committee analyzes suggestions from the men in the field. A card given out by the briefing team members tells the Soldiers that by writing to IDEAS, CDC Headquarters, Ft. Belvoir, Va., they can get their ideas and opinions heard by the Army. The IDEAS committee analyzes the suggestions and, if valid, sends them to the proponent agency for further analysis and action. The IDEAS committee and the Army Sounding Board are similar to the consumer offices set up by independent agencies and commercial firms. Since the Soldier is the user or consumer of military equipment and doctrine, it seems only proper for him to have a point of contact for his opinions and suggestions.

The Army of the Future Briefing Team is one way in which our Army can let the Soldiers know just what is going on. General Norton once said, "The Army of the 70s will not be created by a research scientist; it will be created by the leaders and Soldiers of Today."

CDC's Army of the Future Briefing Team is making sure the Soldiers get that message.

NEEDED: BETTER RECIPES

By Bernard M. Ames

Assemble sufficient eggs, butter, and flour *in accordance with past experience.* Add sugar *as required,* and a pinch of salt, *as appropriate.* If butter is not available and *lateral supply* from another source in the vicinity is *impractical, operational requirements* may be satisfied by *substitution* of margarine *in accordance with directives provided.* However, *adequate prior planning* should *obviate the need for* such substitution, and it is advisable to check your *operating level of supply* before *initiating the operation.* . . . After ingredients are *properly tailored* and balanced, pour into a pan of sufficient size *as dictated by the situation.* Place into an oven preheated *to requirements* and *maintain supervision* of the process to *assure effective and efficient accomplishment* of the baking process. If the batter shifts to one side of the baking pan, *institute necessary corrective action on-the-spot.* As *dictated* by *operational and environmental conditions,* modify oven temperature *in accordance with established operating procedures. For additional details see* pages 97 and 104. . . . This procedure *is equally applicable* whether using clear or unclear measuring bowls; however, in the latter case determination of specific material requirements requires a *more precise estimate of the situation* to assure *proper balance* and *effective and timely results.*

Would you eat the cake prepared according to the directions in the foregoing recipe? Probably not, for it says NOTHING. If followed, it could only lead to indigestion. Yet, many of our Army field manuals which are intended to provide valid, workable, and easily understood recipes for field operations are replete with such nothingness. Like the recipe, too many of the Army's manuals contain little more than generalizations, evasiveness, and vagueness. Either the author doesn't know, or he isn't sure, so he "passes the buck" and lets the reader determine the best solution. It's little wonder that many of the personnel who should be provided decent guidance by our manuals are forced to develop and depend on a multitude of SOP's.

Admittedly, manuals are intended as guides, and no document can give precise answers to all questions that may arise; nor will they be applicable under all circumstances. In my opin-

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ion, though, this argument is being used too often as a crutch to avoid the necessity for clarification of difficult or bothersome problems.

There are other faults, too, that often cause the reader to wonder "why they even bothered to publish a manual. For example, the field manual generally indicates "what" has to be done and, in most cases, "who" is to do it. Too few give examples or spell out "how" it is to be done in sufficient detail to permit reasonably standardized application with great assurance of workability. Still fewer indicate "why" something should be done, and "why" it is better to do it this way than that.

As Baron Von Steuben realized almost 200 years ago, the American Soldier will perform with more vigor, enthusiasm, and efficiency when he is given reasons. The nuclear age—this age of rapidly expanding technology in all areas—has not eliminated this characteristic; in fact, it was inquisitiveness that fostered exploitation of the atom and the neutron, development of the Laser, and manned flights to the Moon. Today, when this country is not actively engaged in all-out war, the Soldier is apt to wonder "why" more often, and likely to perform better when his questions are answered. The modern Soldier, exposed to more news, more often and from more sources than his forefathers, and being the product of an educational environment that has conditioned him to question and reason, wants to know *why;* thus, a basic understanding of problems and situations and the reasons behind them are still the best motivations for willing and dedicated response. Everything has its purpose, and this purpose should be explained—for Army operations, the field manual is the ideal medium for explaining "why", as well as "how" and "who".

If we're to get better field manuals, something must be done to recover field manual writers from the rut into which they've become mired. Evasiveness and generality must go; product improvement and quality control are a must.

Another pitfall that entraps the manual writer is the cross-reference. We can't eliminate this problem entirely, but we can take some of the "wind out of its sails." The argument for the cross-reference is to "eliminate excess duplication"; the result—the reader is chased along a long circuitous path from one manual to another only to be referred, in the last manual, back to the first, with little to show for his efforts except frustration and the feeling that the old ulcer is acting up again. References to a multitude of regulations to provide details of an operation described in the manual is another pitfall—the reader may not have all these regulations, and even if he does, why force him to embark on a major research effort when all essential information can be put in one document.

Then there's the matter of the appendix. It appears to me that whenever a manual writer doesn't know what to do with a piece of information that someone else feels should go in the manual, or when its inclusion will disturb what he thinks is an ideally-organized manual, it invariably ends up as an appendix. The ordinary reader seldom reads a manual from cover to cover—he checks the index to determine the precise location of the subject matter of interest to him, and expects it to be included in the body of the text. Too often he considers appendix material as something included as an afterthought. Thus, it is my contention that except in a few cases required for presentation of a large volume of detailed or tabular material, if the information is of sufficient value to merit inclusion in a manual, it should be given proper emphasis in the body of the text.

The field manual, if it is a good one, can be an indispensable training and operational tool—especially now when ever-increasing reliance is being placed on a well-trained Reserve complement. Yet, the great potential of the field manual remains virtually untapped.

In the last few years great strides have been made in field manual improvement—the cooks are getting better and so are their products. Format has been improved; more procedural "How-to-do-it" information is being included; innovations of many types are being included to make manuals more attractive and easier to read and understand; there is a greater use of color and the writing is getting better. These are long overdue changes to the basic recipe. The US Army Combat Developments Command has pioneered in this approach at innovation and product improvement. FM/29–3, Direct Support Maintenance Battalion, is an example of improvement in field manual style. But there's still a long way to go—the field manual must still tell the Soldier *WHY*, and the field manual writer must frequently check his recipe and his mixture to avoid the product impurities mentioned earlier.

The Point of the Arrow

DECEMBER QUESTIONS

1. The __________ is the lowest level for combined arms teams in Soviet forces.

2. When in the approach march or not in contact with the enemy, the division forms an air defense ________ group commanded by the ________ ________ ________ officer.

3. In combat, or when contact with the enemy is imminent, air defense is controlled by the __________ of the ____ ____ ______.

4. The Soviets, by their doctrine, require a ________ to ________ superiority ratio for the attack.

5. The __________ is the standard close air support aircraft employed by the Soviets.

NOVEMBER ANSWERS

1. Some of the key advantages of the thermal night sights are: (Select 2)
   - [✓ A.] Completely passive.
   - [✓ B.] Ability to see through light dust or fog.
   - C. Easy to positively identify type of tank.
   - D. Less expensive than image intensification night sights.

2. Thermal imagery is superior to image intensification in which of the following areas?
   - A. Resolution is much better with thermal imagery.
   - B. Thermal devices operate in the visible light spectrum.
   - [✓ C.] Thermal imagery needs no ambient light.
   - D. Pound for pound, thermal imagery gives greater range capability with present technology.

3. The technological advances in production of electric power by burning hydrocarbon fuels (JP–4, MOGAS, Diesel) and the resulting heat used to produce electric power using differential of temperature on their mocouples is classified as:
   - A. The fuel cell process.
   - B. Turbo-Alternator process.
   - [✓ C.] Thermoelectric process.
   - D. Super Battery process.

4. The development of scatterable mines is critically dependent upon:
   - A. The development of self-destruct timers.
   - B. The development of influence-type fuzes.
   - [✓ C.] A source of power to provide the energy required for vital functions.
   - D. Successful testing of the XM483 155mm artillery projectile.

5. For guidance information, passive homing missiles require:
   - A. Guidance commands from the launching station.
   - B. Energy (RF, laser, etc) generated at a location remote from and reflected from the target.
   - [✓ C.] A signature generated by the target.
   - D. A combination of A and B.

For God and Country

A Christmas Thought

Hanging in the National Gallery of Art is the beautiful painting, "The Adoration of the Shepherds." It was painted in approximately 1500 A. D. by the Venetian artist, Giorgionne.

This painting shows Mary and Joseph kneeling outside the cavelike stable, admiring the newborn baby. Kneeling on the opposite side of the babe are two shepherds dressed in old, worn clothing, only their profiles visible. In the background is a quiet view of Bethlehem.

Anyone who has felt the warm stirring of the heart upon seeing a newborn child can easily imagine the reactions of the shepherds. They probably rose and went back to their flocks with smiles on their faces and praise on their lips. This child of whom the angels sang was God's perfect gift to the world. This new life was the embodiment of God's love, and of man's faith, hopes, and dreams.

As we concern ourselves this Christmas season with gifts gaily wrapped, let our hearts remember the child wrapped in swaddling clothes. It is his birthday we celebrate.

The birth of the Christ child inspired some of the world's greatest art, literature, and music. Few of us have great talent to share with the world. But think of how much peace and goodwill we could inspire if, in the coming year, each of us followed the example of the shepherds, going about our daily work glorifying and praising God.

PRAYER

O Christ of Bethlehem, let us not forget Thee on Thy birthday. In our busy preparations and our joyous festivities may we not crowd Thee out of our thoughts as Thou wast crowded out of the inn on that first Christmas long ago. Forbid that we should spend all for transient pleasures and fail to find the deeper, richer joys that pass not away at eventide. Draw us back to Thy manger cradle, rekindle our sense of wonder and worship, and grant that, finding Thee in the likeness of a little child, we may feel a new reverence for childhood and a more earnest devotion to those qualities of heart which childhood incarnates. Forgive our cynicism and our pride, banish our doubts, and restore our faith in the things we cannot see or hear: the star that shines in the souls of men, and the song of peace that lingers on in a troubled world. Like the shepherds may we return to our humble tasks feeling that heaven is not so far away, and praising God that he is to be found not only in temples but also among the common things of life. Amen.

CSM Hulett Takes Top Enlisted Slot In CDC

With the departure of CSM Laurence E. Kennedy on 8 December, CSM Hal E. Hulett, Jr. filled the slot of the top enlisted man in the Combat Developments Command. Hulett comes to the CDC Headquarters at Fort Belvoir from Fort Ord, California, where he was the Command Sergeant Major of the Combat Developments Experimentation Command.

Hulett, who was born in Parsons, Kansas, on 28 April 1923, started his 28 year Army career with service in the South Pacific Theater in 1943. He has served in infantry and artillery assignments at many stateside posts, including Fort Sill, Oklahoma, Fort Knox, Kentucky, Fort Riley, Kansas, and Fort Chaffee, Arkansas. He has also seen duty in Germany, Korea, Hawaii, and Vietnam.

CSM Hulett has been a command sergeant major since 1967, when he was named Post Command Sergeant Major at Fort Sill, Oklahoma. From 1970 to 1972, he served as command sergeant major at I Corps in Korea where he was assigned before going to CDEC.

CSM Hulett's awards include: Bronze Star Medal (2 awards), Meritorious Service Medal (2 awards), Air Medal, Purple Heart, Good Conduct Medal, American Campaign ribbon, Asiatic-Pacific Campaign ribbon with Arrowhead and two Bronze stars, World War II Victory Medal, Korean Service Medal, Vietnam Service Medal, Philippine Liberation Medal, UN Service Medal, and the Vietnam Campaign Medal.

On behalf of the Combat Developments Command, the *Arrowhead* would like to welcome CSM Hulett to CDC Headquarters and Fort Belvoir, Va.

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